UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/318,682	05/25/1999	ANIL M. MURCHING	6748-US	1767

7590 09/26/2002

FRANCIS J GRAY
TEKTRONIX INC
P O BOX 500
DELIVERY STATION 50 LAW
BEAVERTON, OR 97077

EXAMINER	
CHAWAN, SHEELA C	
ART UNIT	PAPER NUMBER
2621	

DATE MAILED: 09/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/318,682	Anil M. Murching
Examiner	**Art Unit**
Sheela Chawan	2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jul 3, 2002*.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-10* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on 6/14/02 is/are a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. Applicants' arguments filed on July 3, 2002 (paper # 4/A) have been fully considered but are deemed to be moot in view of the new grounds of rejection.

2. Applicant has submitted formal drawings which have been accepted.

Claim Objections

3. Claims 4 - 10 are objected to because of the following informalities:

Claim 4 is objected to because of the following informalities:

In claim 4, line 5, change " , " to -- ; -- .

In claim 4, line 7 , change " , " to -- ; -- .

Similarly all the claims need to be corrected .

Appropriate correction is required.

Claim Rejections - 35 U.S.C. § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 4 -10, are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuster et al., (US. 5,933,524), in view of Trew et al., (US. 5,280,530).

As per claims 1 and 4, Schuster teaches a method of performing semi-automatic tracking of colored objects (column 6, lines 28 - 29) within a video image sequence comprising the steps of (abstract) :

separating objects within an initial frame (note, segmentation of digital color images on the basis of color histogram which describe the characteristic color properties of the at least one imaged object for determining weather a pixel of a color image which is to be decompose into object segments belongs to a specific object segment or not , column 1, lines 45 - 62) of the video image sequence on the basis of color (column 1, lines 49 - 59, column 2, lines 1 - 10) ;

identifying from the separated objects an object of interest having a centroid (note column 1, lines 49-59, column 3, lines 39-62, column 4, lines 38-65, and column 5, lines 26-56, note, that the centroid b, weighted average μi and Σi are the color moments) ; and

Schuster discloses method for segmentation of digital color images on the basis of color histograms . However, Schuster do not explicitly discloses tracking and a Kalman predictive algorithm applied to the centroid of an object. However, Trew discloses a method and apparatus for tracking a moving object . The system comprises of :

tracking the object of interest through successive frames of the video image (column 1, lines 27 - 60) sequence using a Kalman predictive algorithm applied to the centroid (note, Kalman algorithm are applied to each pixel by taking a block of 3x3 pixels having the pixel of interest at its center (column 4, lines 3- 11) , as shown by Trew the use of Kalman predictive algorithm applied to the centroid of an object because, by using a Kalman filtering process , the object appearance can be updated by incorporating the actual appearance (column 4, lines 3- 11) .

Therefore, it would have been obvious to one with ordinary skill in the art at the time of invention to incorporate the teaching as taught by Trew's into the system of Schuster, because, one with ordinary skill in the art would realize that using a Kalman filtering process , the object appearance can be updated by incorporating the actual appearance , as suggested by Trew at (column 4, lines 3- 11) .

As per claim 5, Trew teaches (New) a method according to claim 4, wherein step (c) includes determining the position of a centroid of the selected object and applying the Kalman predictive algorithm to the centroid (column 4, lines 5- 26).

As per claim 6, Trew teaches (New) a method according to claim 4, wherein step (c) includes determining the position of a centroid based on a color function of the selected object and applying the Kalman predictive algorithm to the centroid (column 4, lines 3-11, 25- 27 , column 11, lines 56- 61) .

As per claim 7, Trew teaches (New) a method according to claim 4, wherein step © includes determining the position of a centroid based on luminance of the selected object and applying the Kalman predictive algorithm to the centroid (column 3, lines 19- 27, column 5, lines 4- 28) .

As per claim 8, Trew teaches (New) a method according to claim 4, wherein each image frame is resolved into multiple blocks and step (a) comprises segmenting the initial frame based on color of the blocks (column 11, lines 49- 61).

As per claim 9, Trew teaches (New) a method according to claim 8, wherein step (b) includes identifying a color model (column 10, lines 51-60) to which the selected object belongs and step (c) includes:

predicting the position of a centroid (column 4, lines 25- 27 , column 5, lines 29- 37) , of the selected (column 5, lines 22- 24) object in a subsequent frame (column 4, lines 50-65) , determining whether the predicted position of the centroid in said subsequent frame is within a boundary of the selected object in said subsequent frame (column 5, lines 29- 37, column 10, lines 25- 60) ,

and, in the event that the predicted position of the centroid told in said subsequent frame is not within the boundary of the selected object in said subsequent frame (column 10, lines 25 - 60) , carrying out a search to identify a block that belongs to the selected color model (column 7, lines 15- 44).

As per claim 10, Trew teaches (New) a method according to claim 4, wherein each image frame is resolved into multiple blocks and step (c) comprises:

determining position and velocity of a centroid of the selected object in the initial frame (note, updating the current picture or initial frame , column 5, lines 29- 37, column 10, lines 25- 60) ,

predicting (column 3, lines 55 - 64) the position of the centroid in a subsequent frame (column 4, lines 25- 27 , column 5, lines 29- 37),

from the predicted position (column 3, lines 61- 68) of the centroid in said subsequent frame (column 4, lines 51- 65), extracting a connected group of blocks in said subsequent frame that belong to the selected object (column 7, lines 15- 44) , and

calculating the positional of the centroid of the selected object in said subsequent frame from the connected group of blocks (column 5, lines 22- 44) .

6. Claims 2 and 3, are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuster et al., (US. 5,933,524), in view of Trew et al., (US. 5,280,530), as applied to the above claim 1, 4 -10 and further in view of Rangan et al., (US.6,198,833) .

Regarding claim 2, Schuster discloses method for segmentation of digital color images on the basis of color histograms . However, Schuster do not explicitly discloses velocity in determining the position of the frame . However, Rangan discloses a method for tracking a moving entity in a video presentation . The system comprises the step of :

from the initial frame determining a position and velocity for the centroid (abstract, column 3, lines 36 - 38) ;

for each successive frame predicting a position of the centroid (note, correcting the position of the object on the frame, column 3, lines 36 - 38, column 4, lines 1-10);

from the predicted position extracting a connected group of blocks that belong to the object of interest (column 2, lines 38- 54);

measuring the position of the centroid in the successive frame from the connected group of blocks (note, measuring the position of moving entity in video by generating a matrix of signature pixels relative to the tracking object and the color values of each of the signature pixels in the first frame thereby creating a color signature for the object, testing the color signature at the plurality of test position in the immediate vicinity of the assumed position against the color signature recorded for the entity , accepting the position with the closest match to the color signature for the entity in which the process is repeated to determine positions for the entity in succeeding frames in the video data , column 2, lines 54-67) ; and

smoothing (column 11, lines 21-30) the measured position and velocity of the centroid (column 9, lines 30-66, column 10, lines 1 -3), as shown by Rangan the use of velocity in

tracking a moving image by the use of vector . The process is thus contained from frame to frame , using the vector as a tool because this would improve a positioning and then testing for accuracy of the object (column 10, lines 1 - 3) .

Therefore, it would have been obvious to one with ordinary skill in the art at the time of invention that by incorporate the teaching as taught by Rangan's into the system of Schuster, because, one with ordinary skill in the art would realize that this would improved the position and accuracy of the object , as suggested by Rangan at (column 10, lines 1 - 3) .

As per claim 3, Rangan teaches the method as recited in claim 1 further comprising the steps of:

detecting whether the centroid in the successive frame is within the object of interest and field of view (column 9, lines 30-67) ; and

applying an error recovery scheme to re-identify the object of interest in the successive frame (column 10, lines 4-13).

Other prior art cited

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Perona et al., (US.6,044,165) discloses apparatus and method for tracking handwriting from visual input .

Roehm et al., (US. 5,293,574) discloses digital X-Ray imaging system with automatic tracking .

Nielson (US. 5,852,792) discloses spacecraft boresight calibration filter .

Gray (US.5,051,751) discloses method of Kalman filtering for estimating the position and velocity of a tracked object .

Contact Information

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela Chawan whose telephone number is (703) 305-4876. If attempts to reach the examiner on Monday through Thursday from 8:30 a.m. to 5: 00 p.m. by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau , can be reached at (703) 305- 4706.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872 - 9314, (for formal communications intended for entry)

Or: Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703)305-3900.

scc

Sheela Chawan
Patent Examiner
Group Art Unit 2621
September 10, 2002

Bhavesh Mehta
Primary Examiner